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# CAREER PREPARATION STANDARDS

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DRAFT INTERIM  
CONTENT AND  
PERFORMANCE  
STANDARDS

# THE CHALLENGE INITIATIVE

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## INTRODUCTION

The Challenge School District Reform Initiative calls on California's educators and parents to embrace a simple but powerful concept: school districts must set high content and performance standards for student achievement—stating clearly and publicly what each student should know and be able to do at the end of each year in each subject area. Schools are challenged to hold themselves accountable for results, reporting precisely how well their students are achieving and how many students are meeting the school district standards.

To further the Challenge Initiative, the following Draft Interim Content and Performance Standards, “Challenging Standards for Student Success,” have been developed in language arts, mathematics, history-social science, science, health education, physical education, visual and performing arts, foreign language, applied learning, service learning, and career preparation. Each set of standards includes an introduction, standards by grade level, examples of the types of work students should be able to do to meet the standards, and samples of specific activities or tasks that give students the opportunity to demonstrate that they can meet the standards. Some sets of standards also include samples of student work that meet the standards, and a few have short commentaries on these samples.

The draft Challenge Standards are a product of collaboration among representatives of school districts interested in the Challenge Initiative, curriculum specialists, teachers, and California Department of Education staff. Small working groups began the initial development of the standards in October 1995 and work on them continues, using as a basis the national standards including those from the New Standards Project; school district standards; California curriculum frameworks; and *Every Child a Reader* and *Improving Mathematics Achievement for All California Students*, the Superintendent of Public Instruction's 1995 task force reports on reading and mathematics. In December 1995 the working groups submitted their drafts to the California Department of Education. The complete set of draft Challenge Standards was distributed to representatives of the school districts interested in the Challenge Initiative at a meeting in Sacramento on December 14, 1995.

Several national and state reform efforts promote the development of standards. The New Standards Project, for example, builds on content standards developed by national professional organizations to design an assessment system based on world-class standards of student performance. Improving America's Schools Act of 1994 (IASA) requires school districts to measure student progress toward achieving rigorous state content and performance standards. California Assembly Bill 265, enacted in 1995, also requires the California State Board of Education to adopt academically rigorous statewide content and performance standards.

As part of the Challenge Initiative, participating school districts will now begin to (1) determine how the draft Challenge Standards relate to local standards, (2) gather samples of student work related to each standard, and (3) examine the student work to determine whether or not students are able to meet each standard.

When completed, the content and performance standards will establish a clear set of expectations for what students should know and be able to do at every grade level. These standards are in draft form and continue to be refined. Therefore, any comments are appreciated. General comments and questions about the draft Challenge Standards may be directed to the Assessment Office at (916) 657-3011. Specific comments and questions may be directed to the individuals listed below.

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# AGRICULTURAL EDUCATION

## GRADES 6–8

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### EXPLORATION OF AGRICULTURAL CAREERS

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#### INTRODUCTION

Awareness of agriculture should be developed in the early grades through the infusion of agricultural themes into existing courses. A middle school curriculum promotes extensive student interaction and hands-on experiences for career exploration. The secondary curriculum is based on a core of knowledge and six career-path clusters which provide a coherent sequencing of performance standards to assist students in pursuing careers, advanced training, and higher education. The six career-path clusters include: Agricultural Business Management, Agricultural Mechanics, Animal Science, Natural Resources and Forestry, Ornamental Horticulture, and Plant and Soil Science. Refer to “Agriculture Performance Standards and Integrated Activities - Grades 9–12” and “Agriculture Education Implementation Guide” for a more comprehensive list of standards and integrated performance activities.

The purpose of the Middle Grades Agriculture Education Curriculum is to bridge student learning about agriculture in grades kindergarten through fifth grade, agricultural awareness, and career preparation in grades nine through twelve. Agricultural leadership and career exploration are the primary focus of the middle grades curriculum. Cooperative learning, team building, and interdependency skills are emphasized in the leadership development portion of the program.

The primary goals of the middle grades curriculum in the agricultural education program are to:

- Develop an awareness of and explore careers in agriculture
- Reinforce the academic core standards in science, mathematics, language arts, and social sciences.
- Develop an understanding of agriculture as a system and the economic and social importance it plays in the local community, state, nation, and world.
- Foster interpersonal skill development through emphasis in cooperative learning and team building activities.
- Provide sequential learning experiences to achieve agricultural literacy for all students in public education grades kindergarten through twelve.

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#### STANDARD 1:

Students will understand the complexity and diversity of California’s food and fiber system. Students will describe the production to consumer process.

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#### Examples of the types of work students should be able to do to meet the standard:

- Students explain the steps involved in the production, processing, marketing and sales, and distribution of an agricultural product.
- Given various production regions of the state, students identify the major agricultural commodities of each region.
- Students classify agricultural commodities as being essential to humans through food, clothing, shelter, medicine, or environmental enhancement.

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**STANDARD 2:**

Students will understand the role agriculture has played in the evolution of civilizations and in the development of the United States and California. They will identify factors that influence agriculture and in turn describe how agricultural developments have influenced history.

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**Examples of the types of work students should be able to do to meet the standard:**

- Students compare and contrast different civilizations and societies based on their agricultural practices.
- Given examples of major agricultural events, students describe their role in the development of the United States and California.
- Students explain how geographical and climatic factors affect production in California, the United States, and the world.

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**STANDARD 3:**

Students will understand how agriculture affects the environment and how the environment affects agriculture. They will observe a variety of plant, animal, and microbial life and will examine their dependence on light, soil, water, and air.

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**Examples of the types of work students should be able to do to meet the standard:**

- Students develop models to show the interrelationship among ecosystems.
- Students experiment with various agricultural and environmental factors to show the interdependence between the two.
- Given major issues affecting agriculture today, students report on specific problems and suggest possible solutions.

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**STANDARD 4:**

Students will understand the role of science and technology in agriculture. Students will identify life, earth, and physical science principles employed in agricultural practices and identify different types of technology used in agriculture.

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**Examples of the types of work students should be able to do to meet the standard:**

- Given the opportunity to grow plants in different conditions of light, soil, water, air and/or temperature, students use the scientific method to draw conclusions and predict success.
- Given selected technologies, students discuss uses in agriculture.

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**STANDARD 5:**

Students will understand that agriculture is the world's largest industry, offering great opportunities for entrepreneurship and employment. Students will identify and describe the major economic activities related to agricultural production, supplies/services, transportation/distribution, marketing and trade, research and development processing, and finance.

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**Examples of the types of work students should be able to do to meet the standard:**

- Students discuss the standard of living relative to the development of agriculture on a worldwide basis and compare their personal standard of living with that of an individual in a different country.
- Given selected software or test equipment, students utilize computers and other technologies to solve agriculture problems.

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**STANDARD 6:**

Students will understand the relationship between producers and consumers, the importance of food safety, and the availability of agricultural products in and around the home. Students will identify and analyze consumer concerns regarding safety, nutrition, and cost and their relationship to agricultural production. They will identify resources available within the home and its proximity and will safely utilize the resources for food, fiber, and environmental enhancement.

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**Examples of the types of work students should be able to do to meet the standard:**

- Given the sources of potential health hazards in food, students identify the hazards and propose ways they personally can minimize the hazard from their homes.
- Given several nutrition labels from products, students rank the products in their support of a healthy diet. They defend their selection.

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**STANDARD 7:**

Students will understand the variety of career options available in agriculture. Students will identify opportunities, performance skills required, and advantages of various careers in agriculture.

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**Examples of the types of work students should be able to do to meet the standard:**

- Students compare and contrast the skills, attitudes and education required for entry level, technical, and professional level careers.
- Students describe several safety hazards found in agricultural occupations and describe measures for minimizing the hazards.

**STANDARD 8:**

Students will understand the importance of teamwork and interpersonal skills in the workplace. Students will participate in team-building activities and evaluate fellow students in career-preparation skills.

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**Examples of the types of work students should be able to do to meet the standard:**

- Students identify an activity that serves the class, school or community, and engage in the process of planning, carrying out, and evaluating the activity.

**Samples of specific activities or tasks that give students the opportunity to demonstrate that they can meet the standard:**

- Students list the major components of the agricultural industry including: agricultural production, supplies/services, transportation/distribution, marketing and trade, research and development, processing/preservation, and finance. Students work in small groups to develop a report or presentation on a specific activity, or students work in small groups to select a commodity and follow it through the processes from production to consumption. Individually, each student identifies an area to pursue and present a discussion in support of the choice.

# AGRICULTURAL EDUCATION

## GRADES 9–10

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### AGRICULTURAL CAREER PREPARATION CORE

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#### INTRODUCTION

The core curriculum is designed to provide a foundation in agriculture for students in grades 9–10. Career awareness, career exploration, and skill preparation are integral parts of the curriculum. As students progress through the core and move into specific career clusters, there is a transition of emphasis from career awareness and general exploration to career and occupationally relevant experience of greater scope and depth.

The purpose of the core is to provide opportunities for students to:

- Acquire a broad understanding of all facets of modern agriculture.
- Develop an awareness and appreciation of the many career opportunities in agriculture.
- Participate in occupationally relevant experiences that will assist in career preparation and in the development of the employability skills and attitudes necessary for success in tomorrow's work force.
- Work cooperatively with a group, develop and expand leadership abilities, and earn recognition for performance and service.

The core serves as the foundation for in-depth study in the career-path clusters and specializations. The core is also intended to provide career guidance for students and to foster employability, problem solving, critical thinking, and leadership skills. The focus includes instruction in California agriculture, agricultural business management, animal science, plant and soil science, agricultural mechanics, and natural resources.

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#### STANDARD 1:

Students will understand the interrelationship of California agriculture and society, and the interrelationship of agriculture with the economy, environment, and natural resources.

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#### **Examples of the types of work students should be able to do to meet the standard:**

- Students identify the economic value of leading commodities in agriculture and discuss the impact on the state's economy as well as on the choices of California consumers.
- Students identify the natural resources available to agriculture and explain the mutual influence of natural resources and agricultural operations.

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#### STANDARD 2:

Students will show that they understand the importance of agricultural firms and technology with regard to the production, processing, servicing, and marketing of agricultural products. Students will outline the businesses and technologies needed to deliver agricultural commodities to consumers.

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#### **Examples of the types of work students should be able to do to meet the standard:**

- Given a product, students identify the businesses and technologies employed to bring the agricultural commodities from original production to consumers.
- Given several breakthroughs in technology, students research and describe their impact on agriculture.

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**STANDARD 3:**

Students will show that they understand the use of record keeping, computers, and functions of purchasing and marketing in an agricultural business. Students will maintain and complete a set of records based on their Supervised Practical Experience program (SPE).

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**Examples of the types of work students should be able to do to meet the standard:**

- Students identify and discuss the advantages and disadvantages of using computers as record-keeping tools.
  - Students demonstrate strategies for obtaining credit, supplies, and materials and securing buyers for their products.
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**STANDARD 4:**

Students will show they can recognize traits of effective leaders and their relationship to employability. Students will participate in leadership development activities, including public speaking, leading group discussions, working within a committees conducting business meetings, and problem solving.

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**Examples of the types of work students should be able to do to meet the standard:**

- Students lead a ten to twenty minute discussion on an agricultural issue or leadership concern.
  - Students work on a committee contributing to a student-designed activity for school or community benefit.
  - Given job descriptions, students assess their appearance, education, experience, and listening and communication skills.
  - Students actively engage in and manage a supervised practical experience project which promotes the development of occupational skills relative to a career in agriculture.
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**STANDARD 5:**

Students will show they recognize existing and future employment opportunities in agriculture. Students will explore a variety of agricultural occupations from the areas of plant and animal production, sales and service, ornamental horticulture, mechanics, and natural resource management, and analyze qualifications required for employment.

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**Examples of the types of work students should be able to do to meet the standard:**

- Students describe the six agriculture career clusters and give examples of entry, technical, and professional careers in each cluster.
- Individually, the student completes an individual career/education plan.

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**STANDARD 6:**

Students will show they understand the operating principles of common tools and the safe operation of power tools and small engines. Students will demonstrate safe and appropriate use of selected landscaping and maintenance tools. Students will perform safe maintenance, service, and operation procedures on a small engine.

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**Examples of the types of work students should be able to do to meet the standard:**

- Given a selection of common maintenance and landscaping tools, the student demonstrates the use and safety procedures.
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**STANDARD 7:**

Students will show that they can read and utilize tools for measurement and perform calculations for problem solving. Students will produce and interpret sketches.

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**Examples of the types of work students should be able to do to meet the standard:**

- Students sketch an object showing dimensions.
  - Students calculate area and volume when given dimensions using standard or metric measurements.
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**STANDARD 8:**

Students will show that they understand the anatomy of the major body systems and the basic theory of inheritance. Students will explain the major functions of the digestive, reproductive, circulatory, nervous, muscular, skeletal, respiratory, and endocrine systems. Students will explain and/or diagram the concepts and process of the genetic basis for animal selection, the process of fertilization, and the processes of meiosis and mitosis.

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**Examples of the types of work students should be able to do to meet the standard:**

- Students compare and contrast the basic parts and functions of monogastric and ruminant digestive systems.
  - Student diagram and label the process of meiosis to form sperm and ova, and the process of mitosis.
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**STANDARD 9:**

Students will show that they understand the factors influencing animal nutrition and feeding and identify general symptoms of animal health problems. Students will identify common feed ingredients and explain the uses of different feeds for particular animal species. They will recognize a sick animal, describe its symptoms, and assist in its treatment.

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**Examples of the types of work students should be able to do to meet the standard:**

- Students choose and justify the types of feeds suitable for the digestive system of ruminant, monogastric, and avian species.
  - Students describe the appearance and behavior of a normal, healthy animal.
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**STANDARD 10:**

Students will show they understand the role of soil in plant production and the requirements for plant growth and development. Students will identify and explain the major factors affecting the ability of soil to support plant growth. Students will identify and explain the functions of the major plant systems and structures.

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**Examples of the types of work students should be able to do to meet the standard:**

- Students describe the major components of soil: air, water, organic materials, and minerals.
  - Students identify the major requirements for plant growth.
  - Students explain the functions of the root, stem, leaf, flower, and fruit.
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**STANDARD 11:**

Students will show they understand the role of nutrients, water, and pests in plant production. Students will demonstrate safe methods of fertilizer application and explain the importance of nitrogen, phosphorus, and potassium to plant growth and development.

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**Examples of the types of work students should be able to do to meet the standard:**

- Given a selection of irrigation methods, students explain the major factors affecting selection of those methods.
  - Given a crop scenario, students identify potential pests and explain the major principles of integrated pest management.
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**STANDARD 12:**

Students will show that they are aware of renewable and nonrenewable resources used in agriculture. Students will identify and discuss major issues confronting human, plant, and animal life related to the use of renewable natural resources. Students will discuss the use of recycling and conservation in preserving nonrenewable resources.

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**Examples of the types of work students should be able to do to meet the standard:**

- Students describe and explain how renewable resources are used in agriculture.
- Students describe major issues related to renewable resource management, including: growing population, water, water quality, timber, and wildlife.
- Students describe and explain how fossil fuels are used in agriculture.

**Samples of specific activities or tasks that give students the opportunity to demonstrate that they can meet the standard:**

- Given a choice of various agricultural ownership and nonownership projects, students choose a specific project, design an operational plan, and maintain financial records. They determine possible problems and project financial results. Students keep a journal of income, expenses, and hours associated with the project and then complete financial records. Through oral discussions, students describe the success/failures associated with their projects.

# AGRICULTURAL EDUCATION

## GRADES 11–12

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### AGRICULTURAL CAREER PATHWAYS: AGRICULTURAL BUSINESS MANAGEMENT CAREER PATH

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#### INTRODUCTION

In the agricultural business management career-path cluster students develop knowledge and skills for a variety of career options. The career-path cluster emphasizes leadership development, agricultural business management, employability, and career development skills. The cluster also includes supervised practical experience through agricultural entrepreneurial projects or worksite placements. In this cluster students work in agricultural businesses providing goods and services. Students gain an understanding of business operation and management as they relate to agriculture. Agricultural business management includes topics in finance, economics, business organization, marketing and sales, computer applications, and record-keeping accounting.

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#### STANDARD 1:

Students will show an understanding of the different types of production agriculture and agribusiness ownership and an understanding of the role of management in planning, organizing, controlling, and directing agriculture operations and agribusiness firms. Students will analyze and compare the advantages and disadvantages of cooperative, corporate, single proprietorship, and partnership as the basic ownership structures.

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#### **Examples of the types of work students should be able to do to meet the standard:**

- Given a selection of management strategies and technologies, students compare and contrast the different strategies and techniques, making a selection for their own supervised practical experience program.

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#### STANDARD 2:

Students will show an understanding of basic economic principles as they relate to production agriculture and agribusiness management. They will make management decisions based on their analysis and interpretation of economic information.

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#### **Examples of the types of work students should be able to do to meet the standard:**

- Given a business scenario, students evaluate management decisions and develop a plan based on the economic picture.

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**STANDARD 3:**

Students will show an understanding of financial responsibility and accounting procedures used in production agriculture and agribusiness management. Students will analyze and compare credit sources and types, and calculate repayment ability and cost of credit.

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**Examples of the types of work students should be able to do to meet the standard:**

- Students demonstrate the procedures of accounting and bookkeeping systems commonly used in production agriculture and agribusiness using one system to monitor their own supervised practical experience.
  - Students prepare an enterprise budget and cash flow statement, and indicate management decisions based on financial and production records.
  - Students determine the tax obligations for an agribusiness.
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**STANDARD 4:**

Students will show an understanding of the insurance needs and major points of law applicable to the agriculture sector. They will identify and describe the major legal and insurance concerns of an agribusiness.

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**Examples of the types of work students should be able to do to meet the standard:**

- Students identify the types of insurance available to minimize liability and financial risks.
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**STANDARD 5:**

Students will show an understanding of concepts and functions of marketing and sales in agriculture on both the local and international level. Students will design a marketing plan for an agricultural product or service and present it to a potential business.

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**Examples of the types of work students should be able to do to meet the standard:**

- Students demonstrate agriculture sales in a role-playing situation.
  - Given two countries, students explain the role of governmental, economic, and cultural factors affecting international trade between the United States and each of the two countries.
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**STANDARD 6:**

Students will show an understanding of ethics in agribusiness activities and the importance of labor management relations to agribusiness. They will analyze and interpret questions of ethics.

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**Examples of the types of work students should be able to do to meet the standard:**

- Students identify and evaluate ethical factors affecting labor management.
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**STANDARD 7:**

Students will show an understanding of how private and public organizations and agencies impact agriculture and agribusiness. They will identify, analyze, and compare the purposes, services, and effects of these organizations on agriculture and agribusiness.

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**Examples of the types of work students should be able to do to meet the standard:**

- Students develop a plan that effectively utilizes both private and public organizations and agencies in addressing a major agricultural issue.
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**STANDARD 8:**

Students will show an understanding of the use of the computer in agribusiness for decision making and office management. They will identify and evaluate major uses of computers in agricultural business.

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**Examples of the types of work students should be able to do to meet the standard:**

- Students perform business operations using the database, word processing, and spreadsheet software.
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**STANDARD 9:**

Students will show an understanding of the principles of record keeping. They will maintain and complete a set of financial records based on their supervised practical experience project.

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**Examples of the types of work students should be able to do to meet the standard:**

- Students demonstrate record keeping using two methods or systems, and will explain the differences between financial and production records.
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**STANDARD 10:**

Students will show that they recognize the traits of effective leaders. They will participate in leadership training activities, including public speaking, leading group discussions, working within a committee, conducting business meetings, and problem solving.

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**Examples of the types of work students should be able to do to meet the standard:**

- Students analyze their own leadership skills. Students identify leadership training activities, including public speaking, leading group discussions, working within a committee, conducting business meetings, and problem solving to help build those skills.
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**STANDARD 11:**

Students will show an understanding of the relationship between supervised practical experience projects and their preparation for a career in agriculture. Students will engage in a supervised practical experience employing skills and knowledge learned in the classroom.

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**Examples of the types of work students should be able to do to meet the standard:**

- Students maintain an ongoing record book and identify those specific skills developed in preparation for a career in agriculture.

**Samples of specific activities or tasks that give students the opportunity to demonstrate that they can meet the standard:**

- Students select an agriculture product or service for which they develop a written marketing and advertising campaign. Students (1) develop a computer data base of potential users of the product or service; (2) develop and mail sales flyers; (3) record hours and expenses for the project; (4) evaluate responses; and (5) prepare a written report on findings. (Standards 2, 5, 6, 7, and 8)

# AGRICULTURAL EDUCATION

## GRADES 11–12

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### AGRICULTURAL CAREER PATHWAYS: AGRICULTURAL MECHANICS CAREER PATH

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#### INTRODUCTION

In the agricultural mechanics cluster, students are prepared for careers related to the construction, operation and maintenance of equipment and facilities used by the agriculture industry. Students gain a strong background in technology, physical science principles, construction, mechanics, and welding. Surveying principles, electrical wiring, and hydraulic technology are also studied as part of this cluster.

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#### STANDARD 1:

Students will understand the various welding processes and specifically the principles of welding and cutting. Students will explain the roles of heat and pressure in oxy-fuel welding, cutting, and electric welding.

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#### **Examples of the types of work students should be able to do to meet the standard:**

- Students safely select, adjust, and operate oxy-fuel equipment to construct a project with and without filler rods.
  - Students select and safely employ the appropriate electric welding apparatus and materials to construct a project requiring multiple types of welds meeting industry standards.
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#### STANDARD 2:

Students will understand the safe use of hand/power tools and equipment. Students will identify potential safety problems and develop possible solutions.

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#### **Examples of the types of work students should be able to do to meet the standard:**

- Students demonstrate the safe use of hand/power tools and equipment to include drills, grinders, and cutting equipment.
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#### STANDARD 3:

Students will understand how to safely secure and hoist loads with chains, cables, slings, and rope. They will sketch alternative securing methods to safely handle a particular piece of equipment.

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#### **Examples of the types of work students should be able to do to meet the standard:**

- Students select and safely use the appropriate materials for securing or hoisting a particular load, including binders and mechanical levers and pulleys.

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**STANDARD 4:**

Students will show they understand the use of surveying equipment. They will demonstrate surveying principles through survey instrument adjustment and land measurement activities.

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**Examples of the types of work students should be able to do to meet the standard:**

- Students demonstrate proper surveying principles by completing a slope determination on the local football field.
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**STANDARD 5:**

Students will show they understand the concepts of safe equipment operation and maintenance. Students will identify and compare the different types of engines and their major parts, systems, and principles of operation.

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**Examples of the types of work students should be able to do to meet the standard:**

- Students disassemble and reassemble an engine, leaving it in condition to operate.
  - Students safely adjust, service, maintain, and operate various types of agricultural equipment.
  - Students use an operator's manual to develop service schedules, keep maintenance records, and perform maintenance.
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**STANDARD 6:**

Students will show that they understand the basic principles of hydraulics used in agricultural machinery and processes, including energy, force, pressure, friction, work, power, and Pascal's Law. Students will diagram a complete hydraulic system, labeling parts and identifying potential trouble spots.

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**Examples of the types of work students should be able to do to meet the standard:**

- Students troubleshoot hydraulic systems and propose and execute corrective measures.
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**STANDARD 7:**

Students will show that they understand agricultural industry employee/employer relationships and work evaluation. Students will explain how wages are tied to job performance.

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**Examples of the types of work students should be able to do to meet the standard:**

- Students identify laws relating to employee age, safety, and responsibility, and propose strategies to work within the laws.
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**STANDARD 8:**

Students will show that they understand the basic principles of electricity, D.C. circuits, and electronics as used in agricultural machinery. Students will interpret basic electrical schematics and operate electrical testing devices.

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**Examples of the types of work students should be able to do to meet the standard:**

- Students use the appropriate testing device to locate an electrical problem in a building or machine and propose corrective measures.
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**STANDARD 9:**

Students will show they understand the design, construction, and maintenance of agricultural structures. Students will design, estimate, construct, and maintain a project requiring basic carpentry, concrete/masonry, plumbing, and/or electrical wiring.

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**Examples of the types of work students should be able to do to meet the standard:**

- Students develop a bill of materials to construct the designed agricultural structure.
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**STANDARD 10:**

Students will show an understanding of the principles of record keeping. They will maintain and complete a set of financial records based on their agricultural mechanics supervised practical experience project.

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**Examples of the types of work students should be able to do to meet the standard:**

- Students demonstrate record keeping using two methods or systems, and explain the differences between financial and production records.
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**STANDARD 11:**

Students will show that they recognize the traits of effective leaders. They will participate in leadership training activities, including public speaking, leading group discussions, working within a committee, conducting business meetings, and problem solving.

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**Examples of the types of work students should be able to do to meet the standard:**

- Students analyze their own leadership skills and identify the leadership training activities, including public speaking, leading group discussions, working within a committee, conducting business meetings, and problem solving to help build those skills.
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**STANDARD 12:**

Students will show an understanding of the relationship between supervised practical experience projects and their preparation for a career in agriculture. Students will identify and evaluate specific skills they will develop as they engage in a supervised practical experience employing skills and knowledge learned in the classroom.

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**Examples of the types of work students should be able to do to meet the standard:**

- Students maintain an ongoing record book, including financial information and skills learned.

**Samples of specific activities or tasks that give students the opportunity to demonstrate that they can meet the standard:**

- Using content learned in oxy-acetylene welding, arc welding, electricity, metal working, and plumbing, students use a computer assisted design (CAD) program or working drawing to design, draft, and safely construct a light stand or larger agricultural project. Students discuss and justify in an oral or written statement how they arrived at their design and their choice of materials. (Standards 1, 2, 5, 7, 8, and 9)

# AGRICULTURAL EDUCATION

## GRADES 11–12

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### AGRICULTURAL CAREER PATHWAYS: ANIMAL SCIENCE CAREER PATH

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#### INTRODUCTION

In the animal science career-path cluster students develop knowledge and skills for a variety of career options. The Career-Path Cluster emphasizes leadership development, agricultural business management, employability, and career development skills. The cluster also includes supervised practical experience through agricultural entrepreneurial projects or worksite placements. In this cluster, students learn animal anatomy and physiology, nutrition, reproduction, genetics, and health. Students also understand how the sciences relate to animal production and management.

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#### STANDARD 1:

Students will show that they understand the correct and safe uses of animal facilities and housing, waste management, restraining equipment, and tools. Students will demonstrate safe and appropriate handling and restraint procedures for various species.

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#### Examples of the types of work students should be able to do to meet the standard:

- Given a site, climate, and species, students design and defend an animal housing facility.
  - Students analyze different methods for the disposal and cost-effective recycling of waste, including consideration of environmental impacts.
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#### STANDARD 2:

Students will understand the structure, function, and maintenance of the major organ systems of animals and the relationship to management practices. Students will explain the interrelationship between the circulatory, respiratory, endocrine, digestive, reproductive, skeletal, and muscle systems.

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#### Examples of the types of work students should be able to do to meet the standard:

- Students suggest management practices that enhance the function of the body systems.
  - Given a scenario for the production of a specific species, students describe reproductive management practices and their effect on fetal development.
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#### STANDARD 3:

Students will understand principles of animal nutrition and feeding. Students will trace and explain the pathway of foods through the four different types of digestive systems and the interrelationships between the body systems and organs related to nutrition.

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#### Examples of the types of work students should be able to do to meet the standard:

- Given a species, the student describes the nutrition requirements at each stage of growth and recommends feeds to meet those requirements.

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**STANDARD 4:**

Students will understand the basic theory of inheritance, the genetic basis of animal selection, the process of fertilization, the role(s) of DNA and RNA and the process of meiotic division to form sperm and ova. Students will use probability to predict the phenotypic and genotypic results of a dominant-recessive gene pair to the F2 generation.

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**Examples of the types of work students should be able to do to meet the standard:**

- Students describe breeding systems commonly used in animal production and explain the significance of artificial insemination and embryo transfer.
  - Students identify natural and artificially induced mutations and hybrids and discuss their value to agriculture.
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**STANDARD 5:**

Students will show an understanding of the nature of disease, parasites, and pests as they apply to animal health problems. Students will demonstrate preventative techniques and treatments based on disease symptoms and diagnosis of disease based on symptoms.

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**Examples of the types of work students should be able to do to meet the standard:**

- Students trace the life cycle of a given disease, pest, or parasite and indicate the best stage for control.
  - Students explain control measures for parasites and pests and develop their own parasite control program.
  - Students explain three ways to control diseases, pests, and parasites in a given species.
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**STANDARD 6:**

Students will show an understanding of the principles of animal production, marketing, management, and record keeping. Students will describe different production and marketing strategies, characteristics of each, and their economic importance.

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**Examples of the types of work students should be able to do to meet the standard:**

- Students select an animal to raise or follow from selection through marketing, keeping records of growth and decisions along with financial considerations.
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**STANDARD 7:**

Students will show an understanding of the principles of record keeping. Students will demonstrate record keeping utilizing a variety of methods and systems, and will explain the differences between financial and production records as applied to the supervised practical experience.

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**Examples of the types of work students should be able to do to meet the standard:**

- Students keep records on their supervised practical experience.
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**STANDARD 8:**

Students will show that they recognize the traits of effective leaders. Students will participate in leadership training activities, including public speaking, leading group discussion, working within a committee, conducting business meetings, and problem solving, evaluating after each their own progress in leadership development.

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**Examples of the types of work students should be able to do to meet the standard:**

- Students identify in themselves traits of effective leadership and target several for improvement.
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**STANDARD 9:**

Students will show an understanding of the relationship between supervised practical experience projects and their preparation for a career in agriculture. Students will engage in a supervised practical experience employing skills and knowledge learned in the classroom.

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**Examples of the types of work students should be able to do to meet the standard:**

- Students maintain an ongoing record book that includes financial, time, and skills development records.
  - Students justify their selection of a supervised practical experience in terms of its value to their skill development.
- 

**Samples of specific activities or tasks that give students the opportunity to demonstrate that they can meet the standard:**

- Students maintain an animal through a production cycle, keeping financial and production records (using computer programs when available). The students utilize the California Vocational Agriculture Record Book to maintain these records. Additional leadership development activities for this activity should include completing a proficiency award application and submitting it at the local level and participating in a leadership development activity such as a judging-team competition or a livestock show day. (Standards 1, 2, 3, 4, 5, 6, 7, and 8)

# AGRICULTURAL EDUCATION

## GRADES 11–12

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### AGRICULTURAL CAREER PATHWAYS: FORESTRY AND NATURAL RESOURCES CAREER PATH

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#### INTRODUCTION

In the forestry and natural resources career-path cluster students develop knowledge and skills for a variety of career options. The career-path cluster emphasizes leadership development, agricultural business management, employability, and career development skills. The cluster also includes supervised practical experience through agricultural entrepreneurial projects or worksite placements. This career-path cluster guides students through a study of natural resources and the environment in California and includes the identification and study of forest plants, their uses, culture, and harvest. Topics include energy and nutrient cycles, water resource management, soil conservation, wildlife preservation, forest ecology and multiple-use management. Outdoor recreation, wood and wood product industries, and employment possibilities relative to this career path are included.

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#### STANDARD 1:

Students will show they understand the importance of wildlife species and their physical and behavioral characteristics, habitat, and management. They will compare habitat requirements for different woodland species and identify factors that influence population dynamics; they will identify major waterfowl species, their characteristics, and migratory flyways; and they will compare strategies of fishery and marine resource management.

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#### Examples of the types of work students should be able to do to meet the standard:

- Given a woodland or wetland area, the students survey the wildlife and habitat features, and propose a strategy to maintain or enhance the area.
  - Given a fresh water and a salt water ecosystem, students explain how water quality affects fisheries and marine resource management in each system.
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#### STANDARD 2:

Students will show they understand the cycling of energy, water, and basic elements of the ecosystem. Students will observe, trace, and analyze the roles energy, water, basic elements, and human activity play in the ecosystem.

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#### Examples of the types of work students should be able to do to meet the standard:

- Students identify water-use issues, management practices, conservation, pollution, and water quality, describing the impact of urban, suburban, and rural influences.
- Students compare and contrast two methods of water management in use to maintain a healthy environment and lifestyle.

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**STANDARD 3:**

Students will show they understand soil composition and the factors which affect the use of different types of soil. They will describe practices necessary to manage and conserve soil resources.

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**Examples of the types of work students should be able to do to meet the standard:**

- Students identify the components of a given soil.
  - Given a sloping area, students analyze the soil, slope, and potential use of the land and propose strategies for effective use.
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**STANDARD 4:**

Students will show an understanding of the role of rangelands, their use, and management practices in the economy and ecology of California. Students will outline the distribution of rangelands in California and the endangered plants and animals which inhabit them.

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**Examples of the types of work students should be able to do to meet the standard:**

- Students analyze a rangeland management plan and predict its impact.
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**STANDARD 5:**

Students will show an understanding of basic timber management and political issues in forestry. They will explain the economic importance of forest resources. They will identify and discuss policy issues related to major forest areas of the United States and the world.

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**Examples of the types of work students should be able to do to meet the standard:**

- Basing discussion on the environmental factors influencing the development of a productive forest, students analyze and discuss the impact of forest management strategies on the environment.
  - Students diagnose damage from destructive insects and diseases and propose methods for their management.
  - Students use a plant key to identify trees and other forest plants.
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**STANDARD 6:**

Students will show an understanding of fire chemistry, fire behavior, and the role of prescribed burning and wildlife suppression and preventing forest fires. Students will design a fire control plan for a simulated forest fire.

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**Examples of the types of work students should be able to do to meet the standard:**

- Students outline and describe the activities and role of selected members of a fire suppression team.

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**STANDARD 7:**

Students will show an understanding of recreation from the perspective of both the recreational enthusiast and the resource manager. Students will identify the impact of outdoor recreation on natural resources and how they influence resource management.

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**Examples of the types of work students should be able to do to meet the standard:**

- Students identify and discuss the components of resource management for multiple uses.
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**STANDARD 8:**

Students will show an understanding of the principles of record keeping. Students will demonstrate record keeping utilizing a variety of methods and systems, and will explain the differences between financial and production records.

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**Examples of the types of work students should be able to do to meet the standard:**

- Students record observations and measurements on a site slated for resource/forestry management.
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**STANDARD 9:**

Students will show that they recognize the traits of effective leaders. Students will participate in leadership training activities, including public speaking, leading group discussions, working within a committee, conducting business meetings, and problem solving.

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**Examples of the types of work students should be able to do to meet the standard:**

- Students identify the personnel management skills needed by a park ranger, crew boss, or refuge operator, and analyze the development of their own skills.
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**STANDARD 10:**

Students will show an understanding of the relationship between supervised practical experience projects and their preparation for a career in agriculture. Students will engage in a supervised practical experience employing skills and knowledge learned in the classroom, maintain an ongoing record book, and identify their needs for continued skill development.

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**Examples of the types of work students should be able to do to meet the standard:**

- Students select skills needed for a career in natural resources or forestry, compare them with those that can be learned in the supervised practical experience, and develop a plan for gaining those missed skills.

**Samples of specific activities or tasks that give students the opportunity to demonstrate that they can meet the standard:**

- Students survey the local area and develop a land-use plan using several resources such as soil surveys and geological maps. The plan should include designation of agricultural areas, residential areas, and recreational areas. Students present their plans in oral and written formats incorporating a map of the area and a list of jobs created by implementation of the plan. (Standards 1, 2, 3, 5, 7, 8, 9, and 10)

# AGRICULTURAL EDUCATION

## GRADES 11–12

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### AGRICULTURAL CAREER PATHWAYS: ORNAMENTAL HORTICULTURE CAREER PATH

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#### INTRODUCTION

In the ornamental horticulture career-path cluster students develop knowledge and skills for a variety of career options. The career-path cluster emphasizes leadership development, agricultural business management, employability, and career development skills. The cluster also includes supervised practical experience through agricultural entrepreneurial projects or worksite placements. In this cluster students are prepared for careers in the nursery, landscaping, and floral industries. The curriculum includes plant identification, plant physiology, soil science, plant reproduction, nursery production, floriculture, and landscape design, installation, and maintenance.

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#### STANDARD 1:

Students will show an understanding of plant classification and physiology as they apply to plant identification and growth. They will classify and identify plants using botanical growth habits, landscape uses, cultural requirements, and a simple botanical key. They will understand the principles of photosynthesis, transpiration, respiration, plant structure, and cell structure.

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#### Examples of the types of work students should be able to do to meet the standard:

- Given a selection of 200 plants, students classify and identify plants using botanical growth habits, landscape uses, cultural requirements, and a simple botanical key.
- Students demonstrate plant selection and identification for local landscape applications.
- Students raise various plant materials under a variety of conditions, including greenhouse, landscape, and field, and identify the factors affecting plant growth.
- Students safely demonstrate asexual and sexual plant propagation practices and monitor plant development.

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#### STANDARD 2:

Students will show an understanding of the role of soil and other planting media, the principles of integrated pest management, and water management practices for ornamental plants. Students will analyze plant needs and related environmental factors, including soil moisture, weather, soil structure, water penetration and drainage, and demonstrate soil modification, pest management, and irrigation techniques appropriate to plant and environmental conditions.

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#### Examples of the types of work students should be able to do to meet the standard:

- On a school or community site, students prepare and amend soils, calculate fertilizer application rates, implement methods of soil conservation, and evaluate results.
- On a school or community site, students identify pest and disease damage, propose methods of control, and recommend selected pest management practices.
- Students demonstrate safe pesticide handling practices in a simulated or actual application.

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**STANDARD 3:**

Students will show an understanding of the principles of pruning trees and shrubs in the landscape. They will evaluate various plant materials and prune them according to plant and landscape requirements to enhance growth and/or fruit production.

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**Examples of the types of work students should be able to do to meet the standard:**

- Given a tree with specific landscape-use requirements, two students describe and defend pruning cuts necessary for the health of the tree and for landscape use.
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**STANDARD 4:**

Students will show an understanding of the care and maintenance of nursery stock and nursery facilities, and identify nursery conditions commonly found in commercial nursery production. Students will propagate and maintain a horticultural crop to the point of sale.

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**Examples of the types of work students should be able to do to meet the standard:**

- Students identify the conditions in a nursery which foster pest development and propose methods of minimizing the pest threat.
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**STANDARD 5:**

Students will show an understanding of the basic principles of landscape planning, design, construction, and maintenance. Students will design a simple (temporary or permanent) landscape plot and present a proposal to a client.

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**Examples of the types of work students should be able to do to meet the standard:**

- Students install a landscape with “permanent” structures and plant material selected for predetermined characteristics.
  - Students install and/or maintain a lawn area and defend their installation or maintenance operations.
  - Students repair, maintain, and safely operate selected hand tools and power equipment found in the horticulture industry.
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**STANDARD 6:**

Students will show an understanding of the principles and skills of floral design, including identifying, handling, safely preparing, and arranging cut flowers and indoor plants. Students will design and construct floral arrangements and/or corsages for identified purposes.

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**Examples of the types of work students should be able to do to meet the standard:**

- Given a selection of four arrangements, students analyze each for color, harmony, balance and overall design and defend their analysis.
- Given the light, temperature and air flow conditions of a home or office, students select, re-pot, arrange and care for foliage plants.

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**STANDARD 7:**

Students will show an understanding of business practices and the role of support organizations within horticultural industries. They will demonstrate knowledge of purchasing, merchandising, marketing, and record keeping. Students will analyze and compare the services and professional development opportunities provided by support organizations within horticultural industries.

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**Examples of the types of work students should be able to do to meet the standard:**

- Given a school plant sale or work experience opportunity, students purchase, merchandise, market, and keep records for plants and horticultural supplies.
  - Students identify horticulture industry-support organizations and create a professional development plan that will utilize their services for continuing education.
- 

**STANDARD 8:**

Students will show an understanding of the principles of record keeping. Students will demonstrate record keeping utilizing a variety of methods and systems, and will explain the differences between financial and production records.

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**Examples of the types of work students should be able to do to meet the standard:**

- Students use record-keeping tools for pest management, inventory control, supplies, and labor management.
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**STANDARD 9:**

Students will show that they recognize the traits of effective leaders. Students will participate in leadership training activities, including public speaking, leading group discussions, working within a committee, conducting business meetings, and problem solving, evaluating their own development following each activity.

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**Examples of what a student should be able to perform at a proficient level:**

- Given a scenario, personal experience and/or observation, students identify effective leaders, recognize the traits that make them so, and evaluate their own traits of effective leadership.
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**STANDARD 10:**

Students will show an understanding of the relationship between supervised practical experience projects and their preparation for a career in agriculture. Students will engage in a supervised practical experience, employing skills and knowledge learned in the classroom, and maintain an ongoing record book.

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**Examples of the types of work students should be able to do to meet the standard:**

- After reviewing his or her own horticultural skills in the record book, the student develops a list of needed skills, a time frame for acquisition, and a source of instruction in school, industry organizations, or on the job.
-

**Samples of specific activities or tasks that give students the opportunity to demonstrate that they can meet the standard:**

- In groups of four to five, students select an ornamental crop to propagate and grow to a marketable size. They keep a written journal of growth data, observations, cultural practices, skills performed, marketing and sales strategies, financial records, and conclusions. Individually, each student prepares a report reflecting on experiences and plans for future activities. (Standards 1, 2, 4, 7, 8, 9, and 10)

# AGRICULTURAL EDUCATION

## GRADES 11–12

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### AGRICULTURAL CAREER PATHWAYS: PLANT AND SOIL SCIENCE CAREER PATH

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#### INTRODUCTION

In the plant and soil science career-path cluster students develop knowledge and skills for a variety of career options. The career path-cluster emphasizes leadership development, agricultural business management, employability, and career development skills. The cluster also includes supervised practical experience through agricultural entrepreneurial projects or worksite placements. The plant and soil science cluster covers a wide variety of topics, including plant classification, physiology, reproduction, and pathology. Students learn the management of soil, water, pests, and equipment as well as cultural and harvest practices. Advanced topics include plant breeding and biotechnology.

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#### STANDARD 1:

Students will show an understanding of the principles of plant classification and identify plants using a simple botanical key.

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#### Examples of the types of work students should be able to do to meet the standard:

- Given a selection of plants, students identify the plants using a common plant key.
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#### STANDARD 2:

Students will show an understanding of cell functions and cell components. Students will identify the principles of plant inheritance, which will include the structure and role of nuclear and cytoplasmic DNA.

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#### Examples of the types of work students should be able to do to meet the standard:

- Given a series of plants grown in different conditions of humidity, students describe the plants' reactions in terms of cell function.
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#### STANDARD 3:

Students will show an understanding of the plant physiology and growth. Students will describe the factors which influence plant growth, including water, nutrients, and air.

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#### Examples of the types of work students should be able to do to meet the standard:

- Students propose methods to modify the factors and predict plant response.
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#### STANDARD 4:

Students will show an understanding of the difference between sexual and asexual reproduction in plants. They will explain the results of ploidy, diploid-somatic cell, haploid-reproductive, and multiploid cells.

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#### Examples of the types of work students should be able to do to meet the standard:

- Students demonstrate three techniques for successful plant propagation, including budding or grafting, cuttings, and seed propagation.
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**STANDARD 5:**

Students will show an understanding of basic plant pathology and pest problems and their respective economic impacts. They will identify the types of pathogens and pests that affect plants. Students will describe the symptoms of disease and insect damage and methods of management, including genetic resistance.

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**Examples of the types of work students should be able to do to meet the standard:**

- On a given crop or well-defined scenario, students identify types of pathogens and pests that affect plants, proposing control actions with concerns.
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**STANDARD 6:**

Students will show an understanding of crop management and production practices. Students will demonstrate local cultural techniques, including pruning, fertilization, planting, irrigation, harvesting, pesticide safety, and marketing practices.

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**Examples of the types of work students should be able to do to meet the standard:**

- Students describe the practices necessary to effectively manage and conserve soil and water through irrigation, drainage, tillage, and soil and water conservation.
  - After reading the label of a fertilizer or pesticide, and using knowledge about local cultural practices, students develop a plan for timing and safe application.
  - Given a crop on a specific piece of land, students suggest and defend a management procedure.
  - Students service and safely operate a common crop-production implement and identify situations where repairs and maintenance are required.
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**STANDARD 7:**

Students will show an understanding of tissue culture and gene transfer in plant breeding as compared to conventional plant improvement and resistance procedures. They will understand the concept of haploid plants obtained by anther/microscopic culture, protoplast fusion, and gene transfer.

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**Examples of the types of work students should be able to do to meet the standard:**

- Given the most clean situation available, students demonstrate “clean” material handling and predict the success of the “aseptic” propagation techniques.
  - Given examples of recent tissue culture and gene transfer in commercial operations, students identify and discuss public concerns.
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**STANDARD 8:**

Students will show an understanding of the principles of record keeping. They will demonstrate record keeping utilizing a variety of methods and systems, and will explain the differences between financial and production records.

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**Examples of the types of work students should be able to do to meet the standard:**

- Using common monitoring charts, students record the operations and growth of an agricultural crop; from the plotted data, students predict the outcome if the operations are continued.
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**STANDARD 9:**

Students will show that they recognize the traits of effective leaders. Students will participate in leadership training activities, including public speaking, leading group discussions, working within a committee, conducting business meetings, and problem solving.

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**Examples of the types of work students should be able to do to meet the standard:**

- Students make a presentation to a community group regarding their investigation of a local crop production issue; i.e., dust during almond harvest.
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**STANDARD 10:**

Students will show an understanding of the relationship between supervised practical experience projects and their preparation for a career in agriculture. Students will engage in a supervised practical experience employing skills and knowledge learned in the classroom.

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**Examples of the types of work students should be able to do to meet the standard:**

- Maintain an ongoing record book that includes financial, labor, and skills-development records.
  - Students defend their selection of supervised practical experience by explaining how it supports their skill development in plant and soil science.
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**Samples of specific activities or tasks that give students the opportunity to demonstrate that they can meet the standard:**

- With a partner, students plant the seeds of a given plant along with cuttings from a mature example of the species. In a journal, students individually record pertinent data (i.e., planting date, planting depth, cutting height, and other observations). Data are collected for at least 6 weeks. Students present their graphed results in a short oral report, explaining the importance of sexual and asexual propagation to the agriculture industry. (Standards 3, 4, 5, 6, 8, 9, and 10)